Amendments to the Drawings:

The attached sheets of drawings includes changes to Figs. 1 and 3. These sheets, which include Figs. 1, 2, and 3, replace the original sheets including Figs. 1, 2, and 3.

Attachment: Replacement Sheets

Remarks

This amendment is in response to the office action dated August 21, 2008. Claims 1 and 2 have been amended, Fig. 1 has been amended to include the term "prior art" as requested by the Examiner, Fig. 3 has been amended to more clearly show the collimator and the source, and the specification has been amended to reflect the changes in Fig. 3. No new matter has been added, the added elements in Fig. 3 were described in the specification but were not directly labeled in the figures. Applicant respectfully requests reconsideration in view of the following remarks.

The Examiner has objected to the drawings, requesting that the term "prior art" be added to Fig. 1 and stating that every feature of the invention specified in the claims is not shown. Also, Examiner requests that the title of the invention be changed.

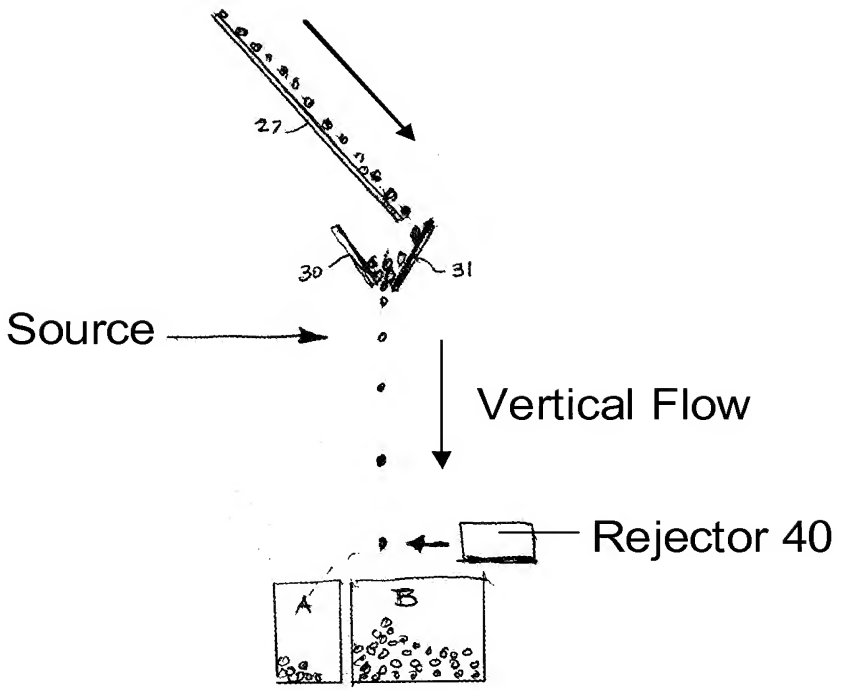
Regarding the collimator in claims 1 and 2 and the source in claim 5, Applicant has amended Fig. 3 to more clearly show these features. As described in the specification (paragraph [0064]), the collimator comprises an inner and outer product guide numbered 30 and 31, respectively. These two guides are nested, coaxial, opposed, and frustoconical and cooperate to form the collimator. Applicant has therefore amended Fig. 3 to include the collimator as numeral 64. The source is described in paragraph [0065] as being located in an optics box 33. As stated in the specification, there is a detector assembly comprising an upper detector and optics box beneath which is mounted for rotation a beam splitting mirror driven by a motor and scanning product in the annular detection area. The product passing through the detection area 36 is bombarded with a source and the reflected or transmitted intensity signal is measured by a detector in the detector and optics box. Applicant submits it would be clear to one skilled in art that the source is contained within the optics box 33, since the beam splitting mirror is located right beneath it and angled such that the beam scans the product in the annular detection area 36. To make this more clear, however, Fig. 3 has been amended to show a source S within the optics box 33.

Regarding the title of the invention, Applicant has amended the title to "Optical Sorting Apparatus and Methods" to make it more descriptive. The invention includes an apparatus and method for sorting a variety of possible objects using otpics. Including more detail about a specific embodiment may be overly narrow and not represent the true scope of the invention.

Accordingly, Applicant respectfully requests the withdrawal of the objections to the drawings and title.

Claims 1-22 have been rejected under 35 U.S.C. § 112 as failing to comply with the written description and enablement requirements. Specifically, the Examiner states that "the collimator whereby the path length from all parts of the flow to said optical element is substantially constant as a consequence of the collimated monolayer flow" is not disclosed. Applicant submits that the stated language in the claim is disclosed in the specification. The product flow is directed in an annulus (ring-like shape) vertically downward (paragraph [0064]). The detector (optical element) is axially located within the annulus (paragraph [0063]). Therefore, if the detector is in the center of the ring, and the product flow is directed vertically downward in a ring around detector, then the flow will be at a constant distance from the detector at all places around the annulus (i.e. the radius).

Regarding the enablement requirement in claims 1 and 2, Applicant submits that it would be clear to one skilled in the art how the collimator makes the material flow as an annular, substantially monolayer concentric particulate flow. As shown in amended Fig. 3 and described in paragraph [0064], the collimator 64 comprises a pair of opposing frustoconical guides for aligning the particulate after it leaves the dispersion plate. The opposing nature of the guides serves to nullify the horizontal component of the particulate velocity by funneling the particulate into the lower end of the opposing guides where the inner guide is at its maximum diameter and the outer guide is at its minimum diameter, leaving only a gap approximately the size of the particulate. It would be clear to one skilled in the art that this result is achievable using of the opposing guides 30 and 31. Below is simplified sketch to further illustrate the concept.



Accordingly, Applicant respectfully requests the withdrawal of the rejection to claims 1-22 under 35 U.S.C. § 112.

Claims 1-2, 4-5, 10, and 12-22 have been rejected under 35 U.S.C. 102(b) as being anticipated by US Patent No. 3,009,571 to Roberts, herein after "*Roberts*." Applicant has amended claims 1 and 2 and respectfully requests reconsideration in view of the following remarks.

Claim 1 recites a sorting method including directing a product flow onto substantially the whole conical flow surface of a dispersion member in a monolayer. The flow

then goes over the edge of the dispersion member and passes through a collimator to form an annular, vertical, concentric monolayer product flow.

Roberts does not teach the invention of claim 1. *Roberts* teaches a dispensing chute 15 with feed channels 17 that are a constant width from the top of the cone to the bottom to permit a single file of articles to pass through. This leaves a large amount of unused surface area of the dispensing chute in between the feed channels. Since the diameter of the conical surface increases towards the bottom of the cone, there is more and more unused space towards the bottom. In contrast, the invention of claim 1 uses the whole surface to allow for a higher throughput.

Another consequence of the individual feed channels 17 of *Roberts* is that the sensing of the articles takes place only at discrete inspection zones corresponding to each channel (claim 1). The invention of claim 1 has a random distribution of product flow over the dispersion member and the detector is able to apply a sorting criterion to the flow no matter where the particulate falls around the axial detector. This once again increases throughput since the product flow is not limited to discrete channels, but can flow over any part of the perimeter of the dispersion member.

Roberts also does not teach the annular and vertical product flow of the invention of claim 1. *Roberts* teaches an arcuate path for each article, resulting in a horizontal and vertical velocity for each article falling from the edge of the dispensing chute. Due to differences in mass between articles, there will be differing velocities and trajectories for each article as they fall into the detection zones. As a result, the articles will not always have the same distance to the detector while in the detection zone. This inconsistent distance will affect the accuracy of the detector due to the inverse square law ($I = I^o/d^2$). In contrast, the invention of claim 1 has a vertical product flow from the collimator so that each particle being detected is at the same distance from the detector because the detector is axially located and the flow is in a ring of constant radius. This allows for more consistent detection with respect to the inverse square law.

Accordingly, Applicant respectfully submits that claim 1 is not anticipated by *Roberts* and requests the withdrawal of the rejection under 35 U.S.C. 102(b) to said claim.

Claim 2 is a sorting apparatus which generally performs the method of claim 1. As shown above, *Roberts* does not teach an apparatus that disburses particulate to substantially all of the dispersion member conical surface or that forms an annular, vertical, substantially monolayer concentric particulate flow. *Roberts* teaches an apparatus with discrete feed channels which do not utilize a significant portion of the dispersion member surface. Also, *Roberts* teaches a product flow that has an arcuate path when leaving the feed channel and entering the inspection zone. This leads to inconsistent distances between the particulate and the detector, which is undesirable due to the inverse square law.

Accordingly, Applicant respectfully submits that claim 2 is not anticipated by *Roberts* and requests the withdrawal of the rejection under 35 U.S.C. 102(b) to said claim.

Claims 5, 10, 12-22 are dependent on claims 1 and 2 and are therefore patentable for at least the same reasons as above, and those that follow.

Claim 5 recites a sorting apparatus according to claim 2, wherein the particulate flow is irradiated by an actual or effectively rotating source. This is not taught by *Roberts*, who teaches an annular array of lights. A rotating source has the advantage that the source is only hitting one particle at a time and only one source is needed to irradiate the whole flow. An array of lights, however, uses multiple sources and can lead to corruption of the signal if light from one of the other sources is hitting another particle and the signal arrives at the same time and combines at the detector.

Claim 15 recites a sorting apparatus wherein the rejectors comprise an annular manifold of a single row of air valves, each valve facing approximately 90 degrees to the particulate flow, substantially parallel to the product flow and offset with a clearance gap therefrom. Since the rejectors are not tied to a particular channel, the particulate that falls over the edge of the dispersion member may not be specifically aligned with one air valve. The detector is therefore able to actuate multiple air valves to effectively sort a particle. In contrast, *Roberts* teaches a single rejector for each channel such that only one air valve impacts the particles from that channel.

Claim 16 recites a sorting apparatus similar to claim 15, but with a plurality of annular manifolds containing air valves. This allows for heavier particles to be impacted by multiple air valves in succession to impart a larger deflection while avoiding the potential problems associated with one large air blast. *Roberts* does not teach any sort of sequential air valve sorting, he teaches a single rejector for each channel.

Accordingly, Applicant respectfully submits that claims 5, 10, and 12-22 are not anticipated by *Roberts* and requests the withdrawal of the rejection under 35 U.S.C. 102(b) to said claims.

Claims 6-9 have been rejected under 35 U.S.C. 103(a) as being unpatentable over *Roberts*. Claims 6-9 are dependent on claim 2 and are therefore patentable for at least the same reasons as above. Accordingly, Applicant respectfully requests the withdrawal of the rejection under 35 U.S.C. 103(a) to claims 6-9.

Claim 11 has been rejected under 35 U.S.C. 103(a) as being unpatentable over *Roberts* in view of US Patent No. 6,855,901 to Guenard et al., hereinafter "*Guenard*." Claim 11 is dependent on claim 2, which is patentable for at least the reasons shown above. *Guenard* does not rectify the deficiencies of *Roberts* to disclose a sorting apparatus that uses the entire conical surface of the dispersion member or an annular vertical product flow. Therefore, Applicant respectfully submits that claim 11 is patentable over *Roberts* in view of *Guenard* and requests the withdrawal of the rejection under 35 U.S.C. 103(a) to said claim.

Reconsideration and reexamination of the application is respectfully requested. Applicant has made a genuine effort to respond to each of the Examiner's objections and rejections in advancing the prosecution of this case. Applicant believes that all formal and substantive requirements for patentability have been met and that this case is in condition for allowance, which action is respectfully requested. If any additional issues need to be resolved, the Examiner is requested to telephone the undersigned at his convenience.

The Commissioner is hereby authorized to charge the three month extension of time and any additional fees or credit any overpayments as a result of the filing of this paper to Deposit Account No. 02-3978.

Respectfully submitted,

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